Amendments to the Specification:

On page 1, at line 3, insert the following paragraph:

This application claims benefit of priority to French Patent Application No. FR 0215552 filed December 9, 2002.

On page 1, please replace the paragraph at line 9 with the following amended paragraph:

Background

The use of these complex structures, and in particular those obtained by assembling structures of different materials, is increasingly widespread in microelectronics, for highly diverse reasons. For example, these complex structures, also known as heterostructures, reduce costs by avoiding the use of costly solid (for example silicon carbide) substrates. In the case of an SOI (silicon on insulator) substrate, for example, they also facilitate isolating components from each other, thereby increasing the integration density, limiting component consumption, increasing speed, ~~etc~~ and the like.

On page 1, please replace the paragraph at line 20 as follows:

~~**Description of the prior art**~~

On page 2, please replace the paragraph at line 21 with the following amended paragraph:

It is known in the art that curving a structure modifies its lattice parameter. However, it is not immediately apparent how to exploit this fact to produce epitaxial growth of high quality. ~~because,~~ Therefore, a need exists ~~without modifying the epitaxial growth plant, how can it be possible~~ to accurately and reliably produce an epitaxially grown substrate with a matched lattice parameter from a given unsuitable substrate~~,~~ ~~and how can this be achieved accurately and reproducibly?~~ without modifying the epitaxial growth system.

On page 2, please replace the paragraph at line 29 with the following amended paragraph:

Brief Summary ~~of the invention~~

On page 9, please replace the paragraph at line 23 with the following amended paragraph:

Breief Description Of The Drawing

Other aspects and advantages of the invention will become apparent on reading the following detailed description of particular embodiments of the invention provided by way of nonlimiting examples. The description refers to the appended drawings, in which:

On page 9, please replace the paragraph at line 23 with the following amended paragraph:

FIG. ~~figure~~ 1 is a diagram of one non-limiting embodiment of the method of the invention~~,~~;

On page 9, please replace the paragraph at line 25 with the following amended paragraph:

FIGs ~~figures~~ 2, 3 and 4 show different ways of stressing basic structures to be assembled~~,~~;

On page 9, please replace the paragraph at line 27 with the following amended paragraph:

FIGs ~~figures~~ 5A and 5B show two examples of conditioning a basic structure to prevent trapping air bubbles during assembly~~,~~;

On page 9, please replace the paragraph at line 30 with the following amended paragraph:

FIGs ~~figures~~ 6A, 6B, 6C and 6D show one method of stressing a thin film by thinning stressed complex structures~~,~~;

On page 9, please replace the paragraph at line 33 with the following amended paragraph:

FIGs ~~figures~~ 7A and 7B are diagrams of the evolution with temperature of the stresses at the two surfaces of a silicon substrate within a complex structure obtained by assembling silica and silicon substrates, with or without prestressing~~,~~;

On page 10, please replace the paragraph at line 3 with the following amended paragraph:

FIGs ~~figures~~ 8A and 8B are diagrams of the evolution of the stresses with temperature at the bonding interface of a thin silicon layer of a complex structure obtained by silicon-silica assembly, with or without prestressing~~,~~;

On page 10, please replace the paragraph at line 7 with the following amended paragraph:

FIGs ~~figures~~ 9A to 9F show the production of an epitaxy substrate of given lattice parameter~~,~~; and

On page 10, please replace the paragraph at line 9 with the following amended paragraph:

FIG. ~~figure~~ 10 is a diagrammatic view in section of a pair of deformable preforms.

On page 10, please replace the paragraphs at line 11 with the following amended paragraph:

Detailed Description ~~description of embodiments of the invention~~

On page 10, please replace the paragraph at line 19 with the following amended paragraph:

FIG. 1 **~~Figure 1~~** shows one non-limiting embodiment of the invention. A first basic structure 1 is deformed by aspirating it onto a first preform 2 of specific shape, for example of spherical concave shape. Aspiration is effected by means of aspiration channels 5 opening onto the surface of the preform. Seals 6 at the

periphery of the preform support the first structure 1 and ensure a pressure difference is obtained between the two faces of that structure. Because of this pressure difference, the structure is deformed to espouse the shape of the first preform 2. Because of this deformation, stresses familiar to and quantifiable by the person skilled in the art are generated within the first structure 1 and in particular at its exposed face (here its upper face).

On page 11, please replace the paragraphs at line 29 with the following amended paragraph:

As shown in FIG. ~~Figure~~ 2, a variant of the method replaces the first preform 2 with a hollow device 7 having a central cavity 8. The periphery of the first structure 1 then rests on this device with seals 9 sandwiched between them. Aspiration channels 10 reduce the pressure inside the cavity. Adjusting the pressure difference between the two faces of the first structure 1 deforms the first structure 1 to a particular curvature. For example, for a vacuum in the cavity of approximately 0.25 bar, the other face of the structure being exposed to atmospheric pressure, a deflection of 3 mm is obtained in the case of a standard 200 mm diameter silicon wafer 750 μm thick using a seal of 195 mm diameter. The first structure 1 can then be assembled to the second structure 3 in the manner explained above.

On page 12, please replace the paragraph at line 9 with the following amended paragraph:

FIG. ~~Figure~~ 3 shows another variant which consists in deforming the second structure 3 between two appropriate preforms of complementary shape, one (12) concave and the other (11) convex. The convex preform is provided with aspiration channels 14 for holding the second structure 3 in position after deformation and removal of the concave preform 12. The second structure 3 may then be assembled to the first structure 1, which itself has already been deformed, by bonding with the aid of an adhesive, for example. Another variant assembles the two basic structures by molecular bonding at room temperature and without stress. The assembled structure is then deformed between two complementary molds. After verifying that

each of the structures is fastened to one of the molds (for example by aspiration), the assembled structure is separated from the molecular bonding area by any means known to the person skilled in the art. This yields two stressed basic structures that may thereafter be assembled in accordance with the invention. This variant has the advantage of preserving the surface state of the faces to be assembled, for example enabling assembly of the two stressed basic structures by further molecular bonding.

On page 12, please replace the paragraph at line 9 with the following amended paragraph:

In a further variant, shown in FIG. ~~figure 4~~, the two structures 1 and 3 are placed face to face without bonding them and are deformed simultaneously between a concave preform 15 and a convex preform 16 with complementary shapes. In figure 4 the arrows show the pressure forces to be applied to cause the deformation. The two structures are then deformed conjointly, a film of air remaining between the two structures. Once the required curvature has been achieved, the air film is evacuated and, because of the forces applied, bonding by molecular adhesion then takes place.

On page 13, please replace the paragraph at line 4 with the following amended paragraph:

In a further variant, shown in ~~figure~~ FIG. 4, the two structures 1 and 3 are placed face to face without bonding them and are deformed simultaneously between a concave preform 15 and a convex preform 16 with complementary shapes. In ~~figure~~ FIG. 4 the arrows show the pressure forces to be applied to cause the deformation. The two structures are then deformed conjointly, a film of air remaining between the two structures. Once the required curvature has been achieved, the air film is evacuated and, because of the forces applied, bonding by molecular adhesion then takes place.

On page 13, please replace the paragraph at line 22 with the following amended paragraph:

When the second structure 3 is deformed between the first structure 1 and the preform 4, an air bubble may be trapped between the two structures and impede bonding by molecular adhesion. To evacuate this air bubble, it is advantageous to pierce one or both of the structures to be assembled at their center 17, as shown in FIG. ~~figure~~ 5A, for example by laser drilling or deep etching of the structure. Aspiration means may advantageously be provided to facilitate evacuation of the air bubble through the resulting hole.

On page 13, please replace the paragraph at line 32 with the following amended paragraph:

An alternative is to provide on one or both structures one or more evacuation channels 18 on the face to be assembled and discharging at the edge of the wafer, as shown in FIG. ~~figure~~ 5B. For example, these channels may have dimensions of the order of a width of 100 μm and a depth of 5 μm and be produced by the usual lithography and etching techniques. Aspiration means could advantageously be provided for aspirating the trapped air via the holes.

On page 15, please replace the paragraph at line 18 with the following amended paragraph:

FIG. ~~Figure~~ 6A shows the complex structure obtained after assembling a first structure 1 and a second structure 3 in the situation where the first structure 1 is deformed by a spherical concave preform and the second structure 3 is deformed by a spherical convex preform. In this case, the assembled face of the first structure 1 is spherical concave and is therefore in compression. The assembled face of the second structure 3 is spherical convex and is therefore in tension. The arrows in ~~figure~~ FIG. 6A represent the tangential internal stresses within the complex structure at the level of the assembled faces.

On page 15, please replace the paragraph at line 29 with the following amended paragraph:

If one of the structures 1 or 3 is thinned, the internal stresses within the complex structure evolve again, in a predictable manner that is familiar to the person skilled in the art. If the first structure 1 is thinned, for example, the second structure 3 tends to relax, ~~i.e.~~ such as to resume its flatness, being less and less stressed by the thinned first structure 1. This is reflected in a reduction in the stresses on the assembled face of the second structure 3, generating, by virtue of the bonding, an increase in the stresses on the assembled face of the first structure 1. If thinning is continued until the first structure 1 is reduced to a thin film, there is obtained, as shown in ~~figure~~ FIG. 6B, a second structure 3 that is virtually flat, practically free of stress, and assembled to a thin film derived from the first structure 1 within which the internal stresses are relatively homogeneous and higher than those present at the assembled face of the structure 1 before thinning.

On page 16, please replace the paragraph at line 13 with the following amended paragraph:

If required, the above method may be iterated as many times as necessary to obtain a given stress within a thin film. Accordingly, starting from the preceding example, for example, the structure obtained (consisting of the thin film derived from the first structure 1 bonded to the second structure 3) is assembled with another structure 19 after stressing both structures. The structure containing the thin film is advantageously curved so that the thin film is even more compressed before bonding, for example by virtue of curvature applied by means of a concave preform, as shown in ~~figure~~ FIG. 6C. The structure 19 is stressed by a convex preform so that its face to be assembled to the free face of the thin film 1 is expanded. This is followed by thinning (or even eliminating) the second structure 3, for example by mechanical means. As previously explained, the structure 19 relaxes progressively and there is finally obtained a thin film derived from the first structure 1 within which the internal stresses have been further increased, which is transferred onto a relaxed structure 19, as shown in ~~figure~~ FIG. 6D.

On page 17, please replace the paragraph at line 20 with the following amended paragraph:

Consider, for example, a heterostructure formed of a layer of silicon (typically 750 μm thick) bonded to a fused silica substrate (typically of the order of 1200 μm thick) by bonding by molecular adhesion without prestressing. FIG. ~~Figure~~ 7A shows the evolution of the stresses on the two faces of the silicon, i.e. the assembled face and the exposed face, as a function of the temperature during heat treatment, for example. Since silicon has a coefficient of thermal expansion higher than fused silica, when the temperature rises expansion of the assembled face of the silicon is impeded by the fused silica, which expands less than silicon. This face is therefore stressed in compression, causing expansion of its exposed face because of the stiffness of the silicon. If this evolution is not controlled, it can generate internal stresses within the structure that can damage or even destroy it.

On page 18, please replace the paragraph at line 6 with the following amended paragraph:

This evolution of the stresses with temperature is perfectly familiar to and quantifiable by the person skilled in the art. It is described in the following documents in particular: S. Timoshenko, J. Opt. Soc. Am. 11 (1925) page 233 and D. Feijoo, I, Ong, K. Mitani, W. S. Yang, S. Yu and U. M. Gösele, Zhe-Chuan Feng and Hong-du Liu J; Appl. Phys. 54(1), 1983, page 83 "Generalized formula for curvature radius and layer stresses caused by thermal strain in semiconductor multilayer structures". To a first approximation, using continuous elastic theory mechanical calculations, if the materials are considered to be isotropic and the coefficients of thermal expansion are considered to be constant over the applicable temperature range, the evolution of the stresses is approximately linear with temperature, as shown in FIGs. ~~figures~~ 7A and 7B. More complex calculations (for example finite element calculations) may be used to refine these results.

On page 19, please replace the paragraph at line 23 with the following amended paragraph:

Consider, for example, a thin film of silicon (typically 0.4 μm thick) on a fused silica substrate 1200 μm thick. FIGs. ~~figures~~ 8A shows the evolution of the stresses within the silicon film. Starting from a heterostructure obtained by bonding without

prestressing, the silicon film is progressively compressed as the temperature rises. In this way, for a 0.4 μm thick film of silicon assembled on a 1200 μm thick fused silica substrate, at a temperature of 600°C, compression stresses are obtained within the thin film of the order of 500 MPa, which may approach or even exceed the fixed limit stress.

On page 21, please replace the paragraph at line 17 with the following amended paragraph:

FIGs. ~~Figures~~ 9A to 9F show a practical implementation of the above method. In FIG. ~~figure~~ 9A, an SOI substrate 20 consisting of a layer 22 of silicon on a substrate 20A formed of a silicon substrate and a layer of oxide is bonded under stress to a 400 nm oxidized silicon substrate 21 formed of a layer 21A of silica on a layer 21B of silicon, the face to be assembled of the SOI being in tension and that of the oxidized silicon in compression. After the forces necessary to obtain the curvatures have been removed, the complex structure has a radius of curvature of approximately 1 m. Then, as shown in FIG. ~~figure~~ 9B, the substrate 20A is removed by mechanical-chemical means. The oxide film of the substrate 20A, delimited by the dashed line in FIG. ~~figure~~ 9A, may remain or may be removed if necessary. The silicon film 22 transferred in this way onto the oxidized silicon 21 is then stressed in tension to an average value of approximately 180 MPa, thus forming a new SOI structure. Its lattice parameter is then varied by approximately 0.14%. As shown in FIG. ~~figure~~ 9C, this lattice parameter allows deposition onto the thin film 22 of an SiGe film 23 with a germanium concentration of approximately 3.5% relative to the silicon and with no lattice parameter mismatch. With this concentration of germanium, a germanium difference of plus or minus 0.5% may be tolerated without becoming incompatible with growing a 200 nm layer. The thickness of the SiGe is very homogeneous and its crystal quality is very good. The SiGe film is not stressed because its lattice parameter is respected.